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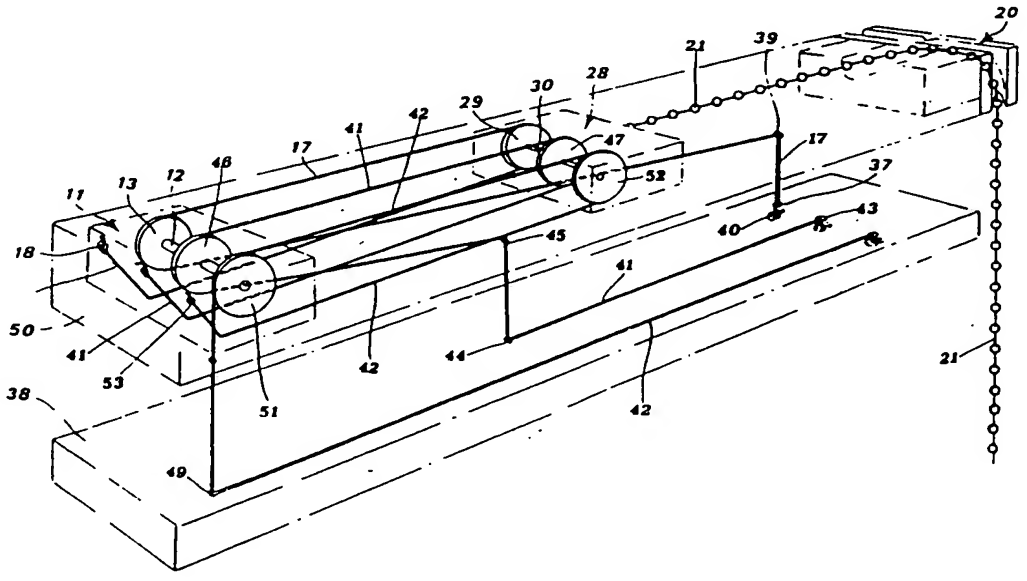

(57) Abstract

Device for operating vertically-operated curtains by means of cords (17, 41, 42) whose top ends pass round two or more contraposed pulleys (13-29, 46, 47, 51, 52) one (13, 46, 51) or more of which is supported by the headpiece (50) of the curtain, and one (29, 47, 52) or more by a carriage (28) sliding axially in relation to said headpiece (50) and connected to a chain (21) which after passing round a means of transmission (20) mounted on the headpiece (50) drops down so that it can be pulled by hand and so that sliding movement of the curtain is multiplied in relation to the movement of the chain (21).

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Any designation of "SU" has effect in the Russian Federation. It is not yet known whether any such designation has effect in other States of the former Soviet Union.

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DEVICE FOR WORKING VERTICALLY-OPERATED WINDOW CURTAINS WITH MULTIPLIED TRAVEL

The invention concerns a device to be used with cords to raise or lower vertically-operated curtains of various kinds such as those that are pleated or rouched, Venetian blinds and others.

It is known that curtains are pulled up and let down by cords which, fixed to a lower cross-piece, pass upward and across the curtain and, having first passed round means of transmission mounted on a headpiece placed at the top of the curtain, drop down again at one end of said headpiece enabling the user to work them as needed.

As it must be possible to raise the curtain for its whole length and as the ends of the cords that drop down at one end of the upper headpiece must reach hand-height, it follows that when the curtain is pulled right up, most of the cord that the user pulls will lie on the floor, bearing in mind the ratio between length of curtain and distance between the ends of the cords at hand-height and the level of the floor.

Cord lengths obviously differ allowing for the fact that they are fixed at different points on the lower cross-piece in relation to the side from which they are pulled.

The curtain is fixed at the desired height by means of a mobile roller which, due to cord friction, moves in the direction of cord movement becoming wedged between an opposing wall and the cords themselves, so fixing them.

It often happens, however, that the roller gets out of place so that the cords cannot be fixed and may even be freed because of one overlying another.

With the sash system the cords may often press against

sharp edges and become broken.

The so-called 'snapdragon' system fixes them firmly but just because of this the cords are liable to wear out and break.

The above invention eliminates all these disadvantages as will be explained hereafter.

Subject of the invention is a device for working vertically operated curtains by means of cords fixed at the lower edge of the curtain and pulled passing, in doing so, through means of transmission placed on a headpiece at the top of the curtain.

The upper ends of the cords pass round two or more opposing pulleys, one or more of which are supported by the curtain's headpiece and one or more by a carriage sliding axially in relation to said headpiece.

To this carriage a chain is fixed and after said chain has passed round a means of transmission on the headpiece,opposite (in relation to the carriage) to the pulleys carried by the headpiece, it drops down to a position within reach of the user's hand.

Therefore, by pulling said chain the carriage moves causing the curtain to be drawn up while, when releasing the chain, movement of the carriage in the opposite direction (caused by the weight of the curtain) allows the curtain to drop.

Curtain movement is multiplied in relation to chain movement in a ratio the value of which differs according to the number of opposing pulleys mounted respectively on the headpiece and on the carriage, and according to whether the upper end of each cord is fixed to said headpiece or to said carriage.

The value of said ratio is 2 to 1 if only one pair of pulleys is used, 4 to 1 if there are two pairs of pulleys or 6 to 1 if there are three pairs of pulleys, or else 3 to 1 if the upper end of each cord is fixed to the carriage and so on.

It is possible to obtain alternative values of ratios between chain movement and curtain movement by making each cord pass once, or more than once, round the pulleys of a single pair.

There may be one or more cords according to the width of the curtain, and they are fixed to the end of the lower cross-piece to which the curtain too is fixed, and possibly at intermediate points.

It is an advantage for the cords to be of a constant length as their lower ends are fixed to one of the ends of the curtain's lower cross-piece (at the end opposite to the position of the pulley mounted on the upper headpiece) and they are carried up to the top headpiece over means of transmission which, as the case may require, are mounted at the other end of the curtain's lower cross-piece or at intermediate points.

Fixing the curtain at different heights is done by means of a transmission block in which there is a downward-facing groove made inside a vertical channel whose end slopes slightly outward, the chain sliding in this channel. .The end of the groove is smaller than the diameter of the little balls placed at regular intervals along the chain.

Therefore, if the chain is pulled at an inclination slightly sharper than that of the bottom of the channel, it can slide freely and the curtain can be pulled up or let down but if the chain is set vertically, one of the little balls becomes stuck in the end of the groove and the curtain is thus held firmly in the desired position.

The advantages of the invention are clear.

There is no surplus length of cord that has to lie on the floor as the ratio between cord movement and curtain move-

ment makes it possible to pull the curtain right up without any part of the cord resting on the floor.

The above ratio means that curtains can be raised or lowered far more quickly and easily.

Length of the cords fixed to the lower cross-piece of the curtain being constant ensures simpler manufacture and installation.

Adoption of a transmission block having a groove in the channel along which a chain, of the kind mentioned above with little balls along it, not only facilitates fixing and releasing the curtain but makes the whole operation simpler and more reliable.

The possibility of mounting the chain on the right or the left of the curtain using a second channel with groove symmetrical to the first channel and on the opposite side of the headpiece, is a further factor in facilitating installation.

All the above is of great benefit to the user who can thus fit curtains that are quick, easy and reliable to draw up and let down, also offering a variety of applications.

Characteristics and purposes of the invention will be made still clearer by the following examples of its execution illustrated by diagrammatic figures.

Fig. 1. Pleated curtain with three cords and with the invented device, longitudinal section.

Fig. 2. The curtain in Fig. 1, cut through, seen from above.

Fig. 3. Diagram of the system, perspective view.

Fig. 4. Transmission block for the chain used to work the curtain, showing the chain locked, perspective view.

Fig. 5. Same as above with the chain moving freely.

Fig. 6. The above curtain with 5 cords, perspective view.

Fig. 7. The curtain in Fig. 6 cut through, seen from above.

Fig.8. Venetian blind with two cords and invented device, perspective view.

Fig.9. Curtain that rouches when raised, with four cords and with the invented device.

The pleated curtain 10 hangs from the upper headpiece 50 onto whose two ends blocks 11 and 20 are respectively forced. The carriage 28 is fitted inside the headpiece.

Block 11 is a body of hard plastic material comprising a 'comb' with 14 teeth carrying a small transversal shaft 12.

Small pulleys 13, free to rotate round said shaft 12, are placed between one tooth and another.

At the back end of the headpiece, behind the teeth, there is a horizontal diaphragm 15 in which five holes 16 are made.

The carriage 28 is a block of plastic material which also has a comb and teeth 31 between which are placed the pulleys 29 freely rotating round the small shaft 30 pressed in transversally in relation to said teeth 31.

There is a hole 35 in the rear wall of said carriage 28.

The cross-piece 38 at the lower edge of the curtain 10, contains holes 37.

Said lower cross-piece 38 is connected to the upper headpiece 50 by means of cords 17, 41 and 42.

Cord 17 passes through the hole 37 in the cross-piece 38 and is held there by a knot 40. When said cord has passed through holes made in the pleats 19 of the curtain and the hole 39 in the upper headpiece 50, it passes round the race on the pulley 13 in block 11, then round the race on pulley 29 in the carriage 28 and finally returns to block 11 passing inside the hole 16 where it is held by the knot 18.

Cord 41, held in the lateral hole 43 of the lower cross-piece 38, passes through the central hole 44 in said cross-piece and from there to the central hole 45 in upper headpiece 50;

then, after passing round pulleys 46 and 47 in block 11 and in the carriage 28 respectively, it is held in said block 11 by means of a knot.

Similarly cord 42 starts from a hole at one end of the cross-piece 38, passes from hole 49 at the other end of said cross-piece and having passed round pulleys 51 and 52 in block 11 and in the carriage 28 respectively, it is then held in said block by the knot 53.

The block 20, placed at the other end of headpiece 50, serves to guide the sliding movement of the chain 21 working the curtain, said chain being then fixed at one end, in hole 35 in the carriage 28, by means of a knot 36.

When chain 21 is pulled to raise the curtain 10, cords 17, 41, 42, having passed round the pairs of pulleys 13-29, 46-47, 51-52, are made to slide for a length double that of chain 21. In block 20, made from a piece of plastic material, there is a longitudinal channel 22 aligned with headpiece 50, that connects with the transversal-vertical channel 24 in which there is a groove 26.

If chain 21 is pulled diagonally outwards, it slides freely in channel 24 but if it is made to lie vertically, one of its balls 27 is stopped by the end of the groove 26 thus locking said chain and therefore the amount of vertically hanging curtain.

By means of channel 23, identical to and symmetrical with channel 24, opposite the longitudinal channel 22, the curtain can be hung as desired with the chain on right or left.

Figs. 5 and 7 show a curtain hung on five cords 60, 61, 62, 63, 64, a useful solution if the curtain is very wide.

Fig. 8 illustrates application of the device to a curtain 70 with slats 71.

In Fig. 9 the device is used for a curtain 72 which rouches when raised.

Clearly, by doubling or increasing the number of pairs of pulleys contraposed between block 11 and carriage 28 further points of transmission can be created for the cords between said block and said carriage.

Each extra pair multiplies the ratio between cord travel and chain travel and this will continually allow greater curtin sliding movement equal to the length of chain that also slides.

CLAIMS

1. Device for working vertically-operated curtains (10 70 72) by cords (17 41 42 60-64) fixed to the lower edge of said curtain (10 70 72) and pulled up to the top over means of transmission mounted on an upper headpiece (50) of the curtain (10 70 72)
characterized in that the upper ends of the cords (17 41 42 60-64) pass round two (13-29, 46-47, 51-52) or more opposed pulleys, one (13 46 51) or more supported by the headpiece (50) of the curtain (10 70 72) and one (29 47 52) or more by a carriage (28) that slides axially in relation to said headpiece (50) and is connected to a chain (21) which, after passing round a means of transmission (20) mounted on the headpiece (50) at an end which, in relation to said carriage (28),is opposite to the pulleys (13 46 51) supported by said headpiece (50), drops down enabling the user to pull on it from below so that, by pulling said chain (21) the consequential movement of the carriage (28) raises the curtain (10 70 72) while, leaving the chain (21) untouched, movement of the carriage (28) in the opposite direction causes the curtain, due to its weight, to be lowered, the value of vertical sliding movement of the curtain in relation to that of the chain (21) being multiplied in a ratio that differs according to the number of contraposed pulleys (13-29, 46-47, 51-52), the pulleys (13 46 51) being placed respectively on the headpiece (50) and pulleys (29 47 52)on the carriage (28) and according to whether the upper ends of the cords (27 41 42 60-64) are fixed to said headpiece (50) or to said carriage (28).

2. Device as in claim 1,
characterized in that the higher value of the ratio between

sliding of the chain (21) and sliding of the curtain (10 70 72) is obtained by causing each cord to pass once or more than once round the pulleys of a single pair.

3. Device as in claim 1,
characterized in that there are two or more cords (17,41, 42, 60-64) according to the width of the curtain (10,70, 72) and these are fixed at one end of the lower cross-piece (38) which in turn is fixed to the curtain (10 70 72) and possibly in intermediate points.

4. Device as in claim 1,
characterized in that the length of the cords (17 41 42 60-64) is constant since their lower ends are tied to one end of the lower cross-piece (38) of the curtain (10 70 72) at the end opposite to the zone where the pulleys (13 46 51) are mounted on the upper headpiece (50) of the curtain (10 70 72)and said cords rise up towards said headpiece (50) over transmission means (44 49) placed, as the case may be, at the other end of the lower cross-piece (38) of the curtain (10 70 82) or in intermediate positions.

5. Device as in claim 1,
characterized in that the curtain (10 70 72) is fixed at the various heights by means of a transmission block (20) in which there is a downward-facing groove (26) made inside a channel (23 24) the bottom of which is slightly sloping towards the outside, and wherein slides the chain (21) the bottom of said groove (26) being smaller than the diameter of the balls (27) placed at regular intervals along the chain (21) so that if the chain (21) is pulled at an inclination slightly greater than that of the bottom of the channel(23 24), the chain (21) can slide freely and the curtain (10 70 72) can be freely raised or lowered, while

if the chain (21) is held vertically, one of the balls (27) will become stuck in the end of the groove (26) thus holding the curtain (10 70 72) firmly in the preferred position.

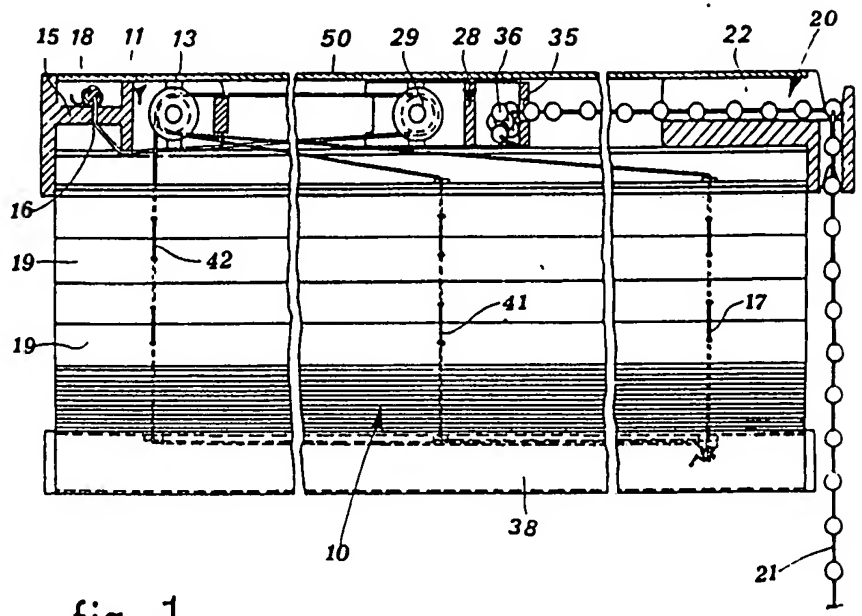

fig. 1

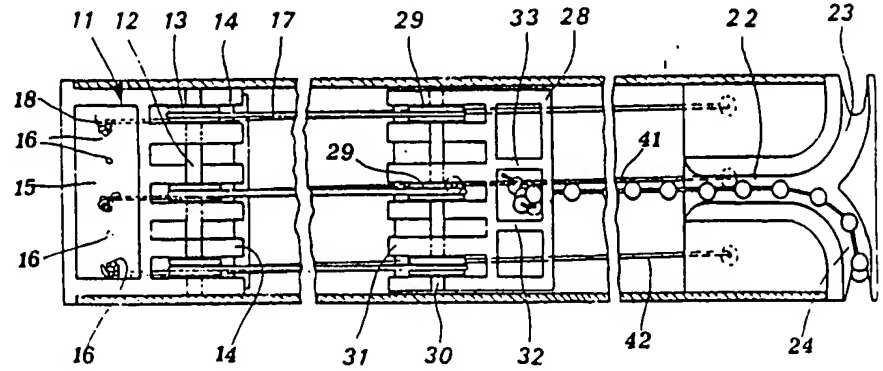

fig. 2

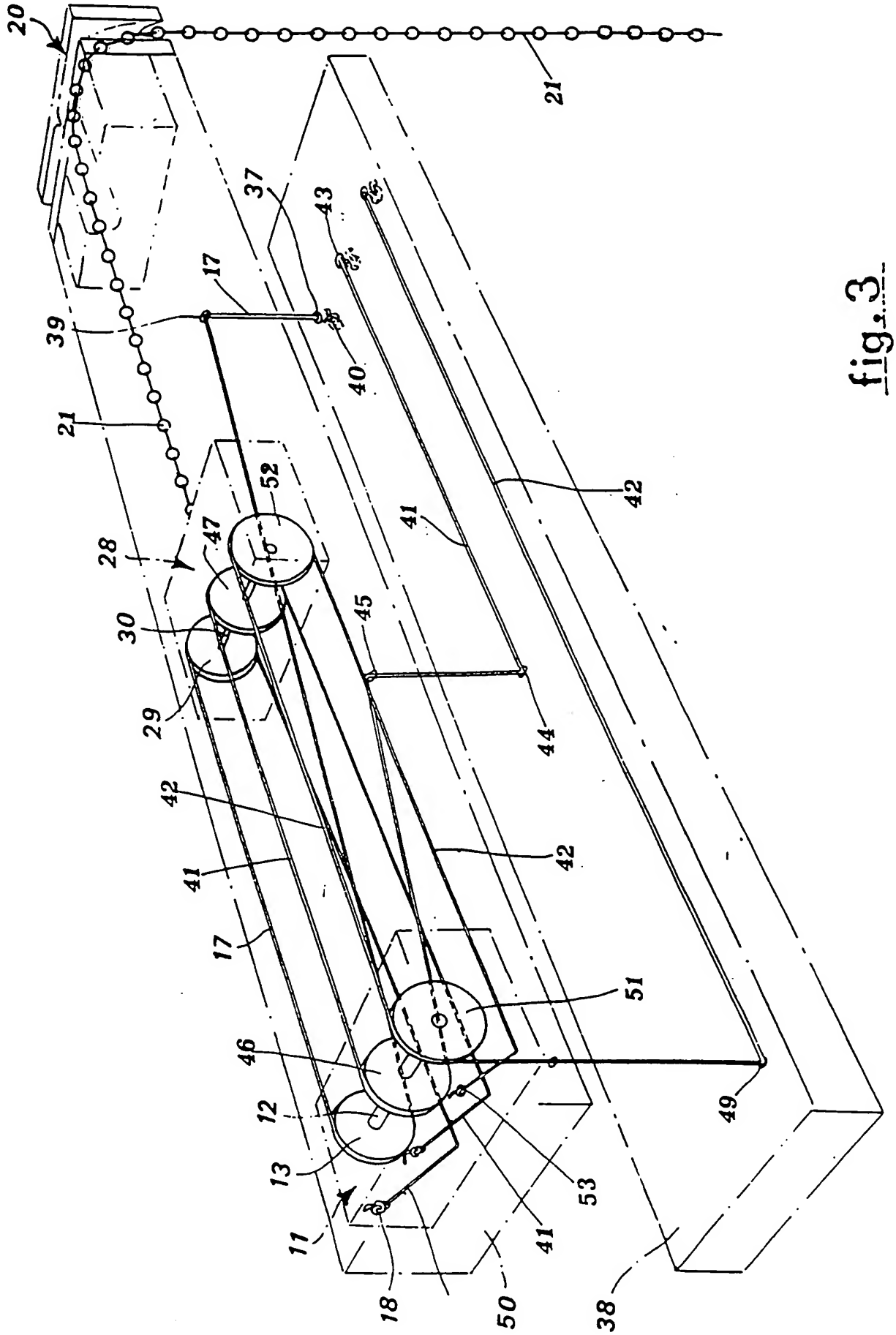
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fig. 3

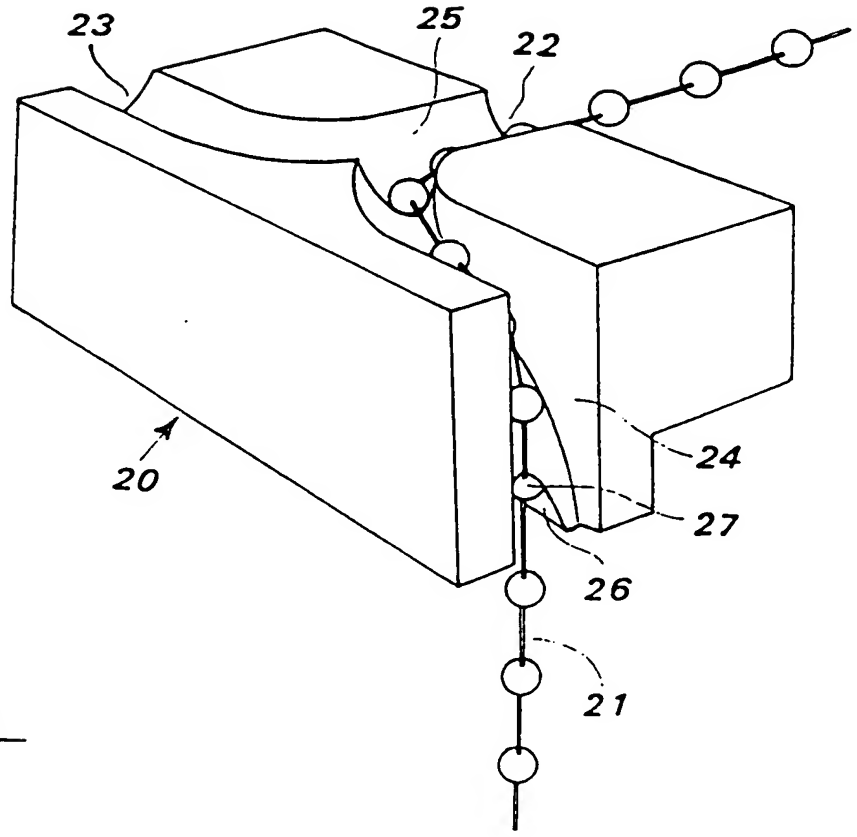

fig. 4

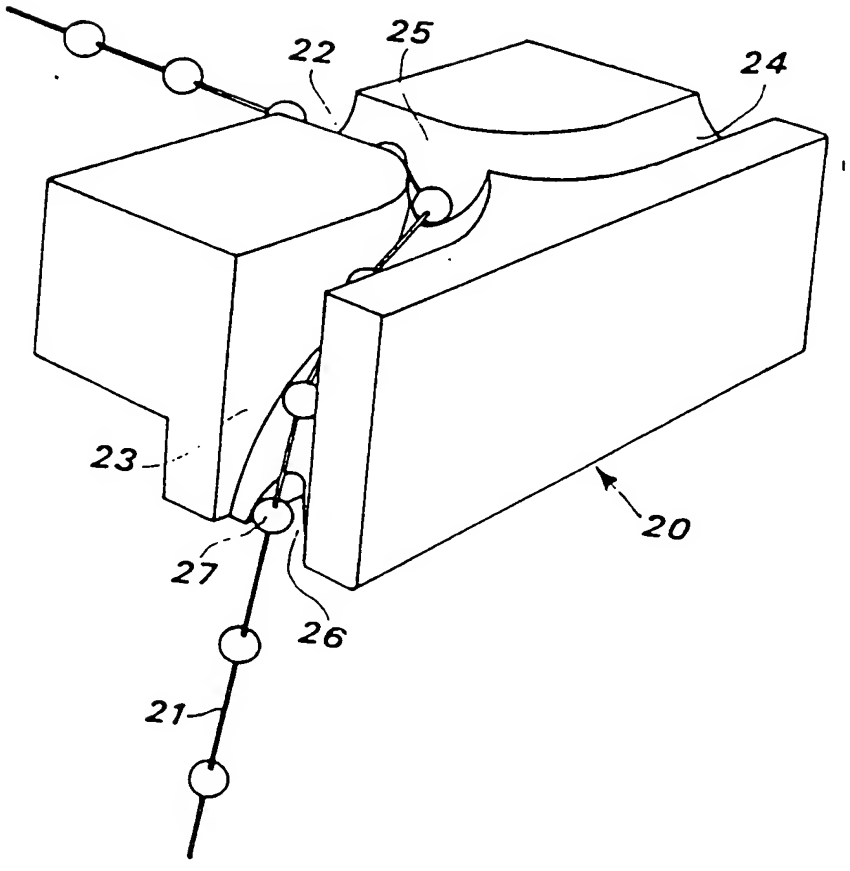

fig. 5

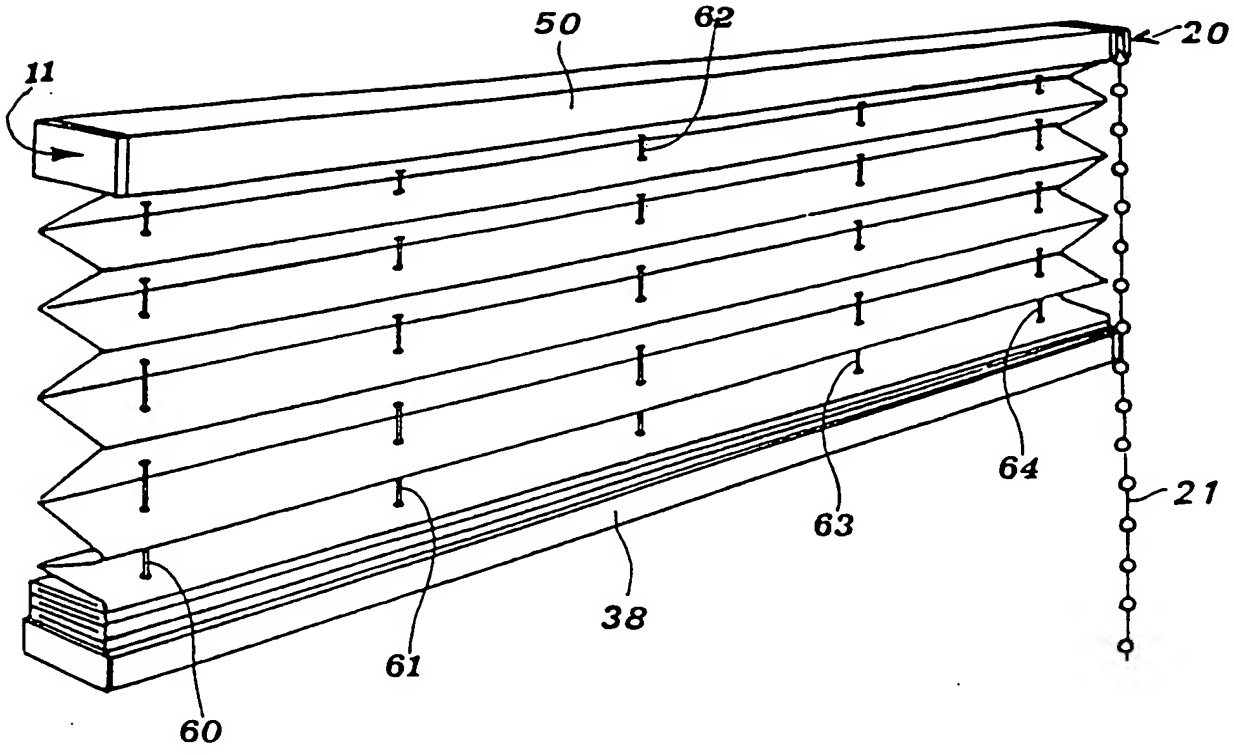
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fig. 6.

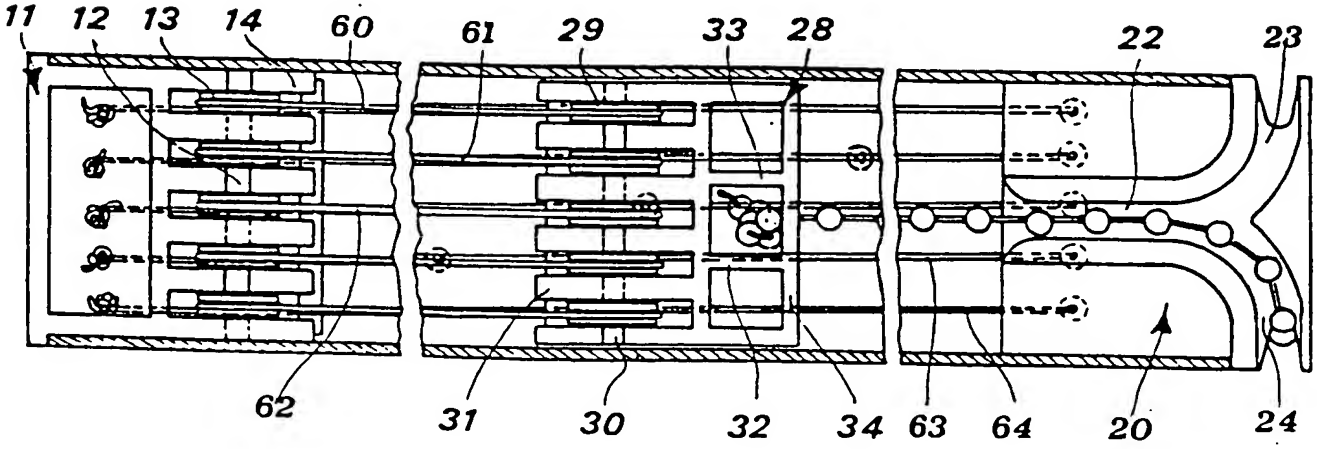
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fig. 7

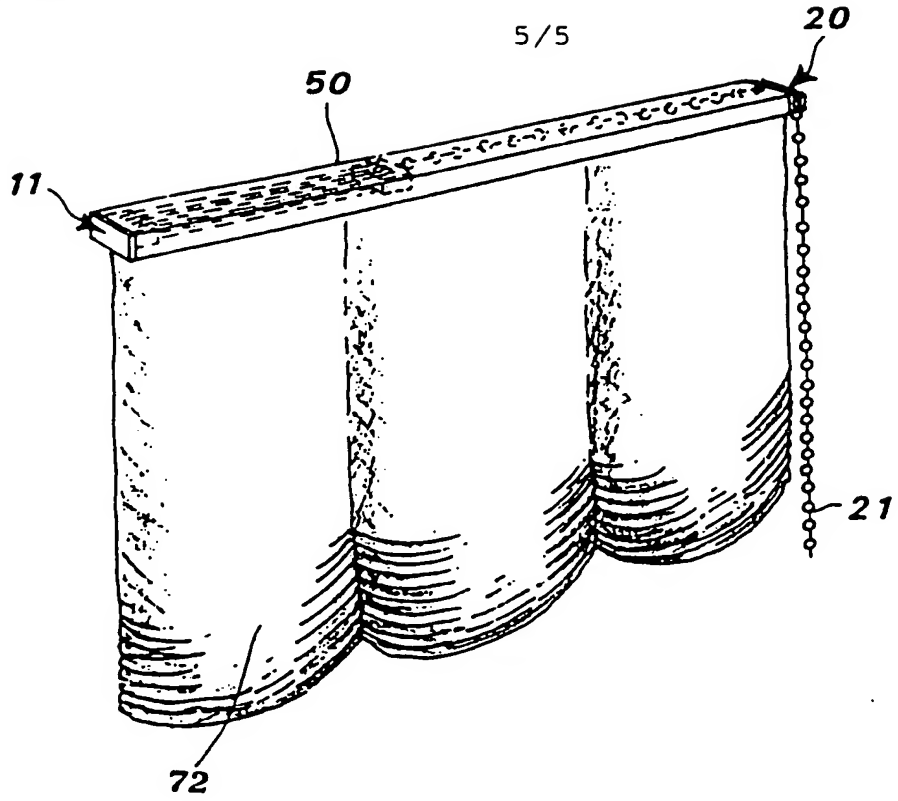
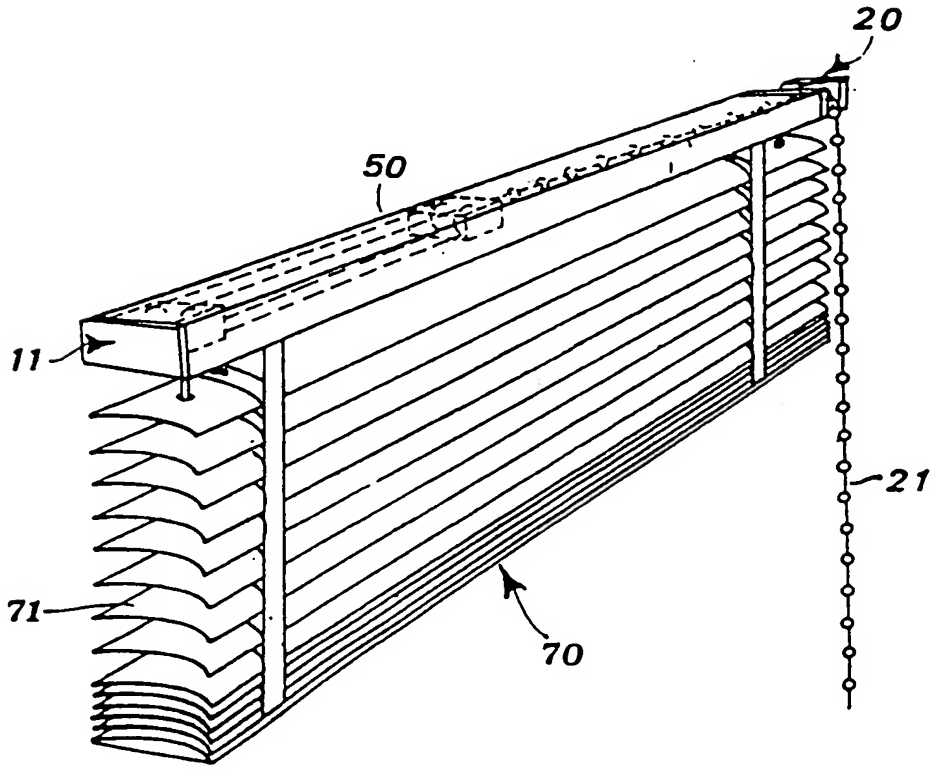


fig. 9

fig. 8



INTERNATIONAL SEARCH REPORT

International Application No PCT/IT 91/00014

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 E06B9/322 ; E06B9/324 ; A47H5/14

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	E06B ; A47H

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No.[13]
Y	US,A,1 407 248 (BROWN) February 21, 1922 see page 3, line 123 - page 4, line 5 see page 4, line 106 - page 5, line 5 see page 5, line 33 - line 63 see page 5, line 1 - page 6, line 48; figures 11,14	1-4
Y	US,A,3 703 920 (DEBS) see column 8, line 47 - column 9, line 18 see column 12, line 50 - column 13, line 21; figures	1-4
A	US,A,1 692 707 (SEARS) June 28, 1924 see the whole document	1-4
A	US,A,4 139 044 (BROLIN) see column 2, line 22 - line 42; figures	5

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26 JUNE 1991	09. 08. 91
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	KUKIDIS S.

International Application No

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	EP,A,162 025 (ARQUATI SPA) see page 6, line 28 - page 7, line 10; figures 6,7,8 ---	5

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US-A-3703920	28-11-72	US-A- 3795266 US-A- 3795267	05-03-74 05-03-74
US-A-1692707		None	
US-A-4139044	13-02-79	None	
EP-A-162025	21-11-85	None	

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